

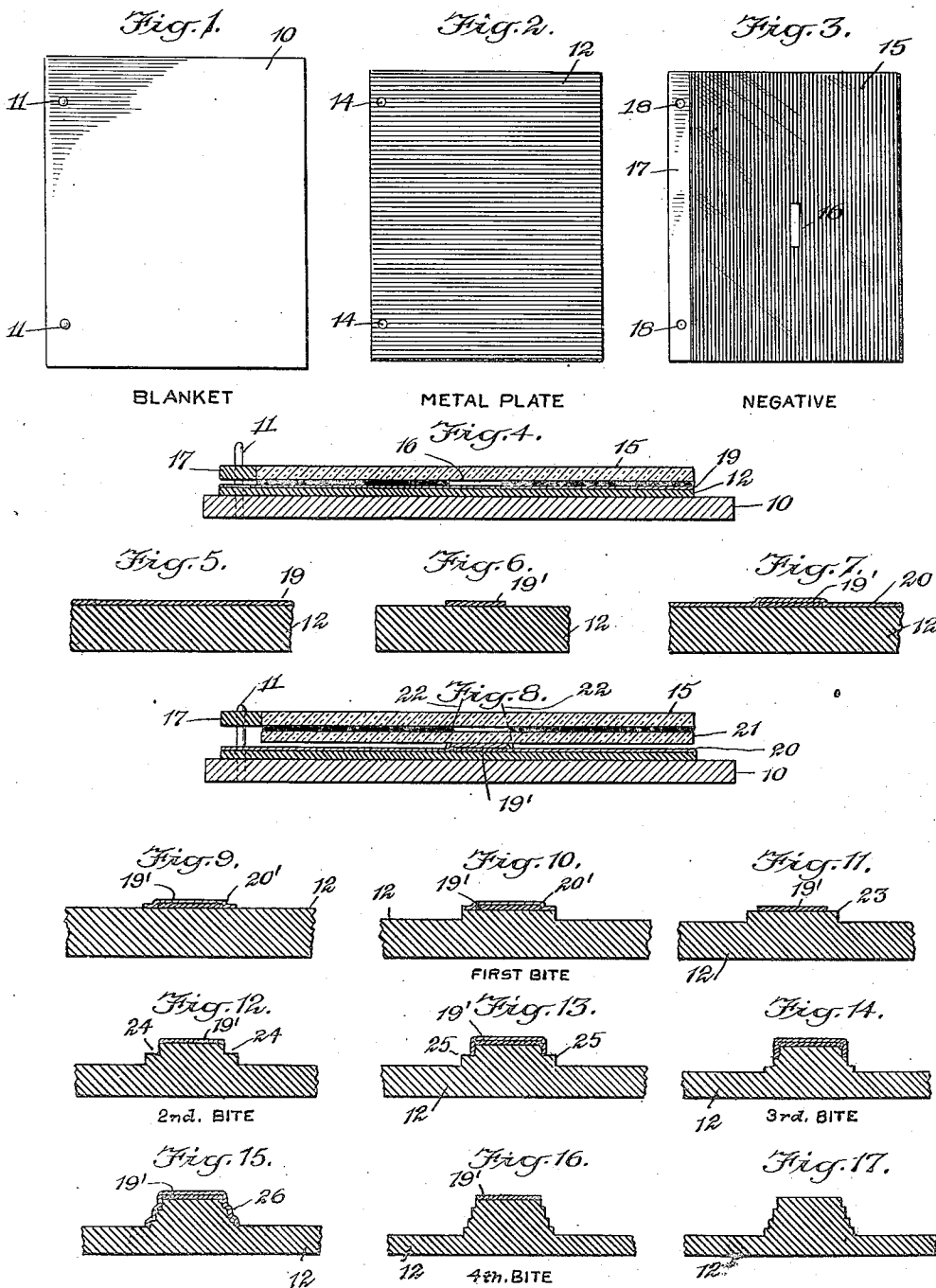
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PROCESS AND APPARATUS FOR MAKING PRINTING PLATES

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WITNESSES

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PROCESS AND APPARATUS FOR MAKING
PRINTING PLATES

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1 Claim. (Cl. 95—5.7)

This invention relates to an improved process and apparatus for making printing plates. My invention has particular application to the etching of photo-engraving and similar printing plates.

The processes heretofore employed in etching photo-engraving and printing plates have not been entirely satisfactory. Thus, the most common process now in use is the so-called dragon's blood process, in which the plate is etched in successive stages or bites, in an acid bath. In between each bite, a fine powder, known as dragons blood, or etching powder, is wiped against the side edges of the printing portions of the plate and is then heated to form a coating for the purpose of protecting the edges from the acid etching bath.

The dragon's blood process is complicated, tedious, and expensive, and to a great extent, depends upon the personal skill and experience of the etcher. Furthermore, in this process, it is difficult to obtain sharp, clear-cut edges on the line portions of the plate, and it is equally difficult to obtain satisfactory, deeply etched half-tone dots.

Other processes heretofore developed, may be used for etching half-tone work, but cannot be used in etching line work, and accordingly their use is very limited.

It is an object of my present invention to overcome the difficulties heretofore encountered in the etching of photo-engraving or similar plates, and to provide an improved process for making printing plates which is equally applicable to half-tone and for line work, which is relatively simple and inexpensive to carry out, which is expeditious and which produces line work having sharp, clear-cut edges and half-tone dots which are well defined and are accurately graduated from high-light dots through the middle tones, to the deep shadow portions.

A further object is the provision of improved apparatus to be used in carrying out my process whereby accurate registry may be readily obtained between the negative and the printing plate.

In the accompanying drawing—

Fig. 1 is a plan view of an improved blanket which may be used in carrying out my process;

Fig. 2 is a plan view of a metal printing plate which may be employed in carrying out my invention;

Fig. 3 is a plan view of a negative transparency which may be used to carry out my process;

Fig. 4 is a cross-sectional view of the blanket,

printing plate and negative in assembled position for making the first exposure in my process;

Fig. 5 is a detail sectional view of a portion of the printing plate showing the first sensitized coating applied thereto;

Fig. 6 is a similar view of the plate with the image developed after the first exposure has been made;

Fig. 7 is also a similar view of the plate showing the second sensitized coating applied thereto;

Fig. 8 is a cross-sectional view of the blanket, printing plate and negative with a transparency interposed between the negative and printing plate, illustrating the manner in which the second exposure in my process is made;

Fig. 9 is a detail sectional view of the plate with the image developed after the second exposure;

Fig. 10 is a similar view of the plate after the first bite has been made in the etching bath;

Fig. 11 is a similar view after the second or outer image has been removed from the plate;

Fig. 12 shows the plate after the second bite has been made;

Fig. 13 shows the plate with a coating of acid-resisting material applied to the printing portion of the plate;

Fig. 14 shows the plate after the third bite has been made;

Fig. 15 shows the plate with another coating of acid-resisting material applied thereto and extending around the side edges of the printing portions to the base of the etched portion of the plate;

Fig. 16 shows the plate after the fourth bite has been made and after the acid-resisting coating has been removed; and

Fig. 17 shows the finished plate ready for use with the sensitized coating removed from the top of the printing portions thereof.

In carrying out my process I form upon a printing plate made of a suitable material, preferably zinc, copper or other metal, a photographic image which is an accurate reproduction of the object which is to be printed. I then form over the top of the first image a second photographic image which is similar to and is superimposed over the first image, but in which each line and half tone dot is slightly larger than the corresponding line and half-tone dot in the original image.

I then place the plate in an etching bath and leave it there for sufficient time to take a deep bite out of all portions thereof which are outside

of the second image. I then remove the coating material forming the second image, leaving the first image thereon and take successive relatively smaller bites in an etching bath in the portions of the plate outside of the first image. Between successive bites I apply an acid-resisting coating to the printing portions of the plate in the manner hereinafter described.

In carrying out my process, I prefer to employ improved apparatus for insuring accurate registry between the negative and printing plate when the successive photographic images are formed on the plate. For this purpose I employ a printing frame having a blanket 10, which may be made of rubber or other suitable material, and which is provided with a pair of posts 11 projecting upwardly, adjacent one of the edges thereof.

The printing plate which is indicated at 12, may be the usual type of photo-engraving plate made of zinc or similar metallic material. However, I provide the plate with a pair of apertures 14, near one edge thereof, and which are adapted to receive the posts 11 when the plate is placed on the blanket in the manner indicated in Figs. 4 and 8.

The negative from which the photographic images are made on the plate, may be formed on the usual type of transparency as shown at 15, made of glass or similar material and the photographic image which for the purpose of simplicity, is shown as a single broad bar or line 16, is formed thereon in the usual manner. Along one edge of the negative I preferably secure a strip or backing 17 which may be made of metal, and the backing is formed with a pair of apertures 18 which are likewise adapted to accommodate the posts 11.

As stated above, the first step in my process consists of forming upon the face of the plate 12, an image which is an accurate reproduction of the image which is to be printed by the plate. This image is conveniently produced by photographic processes and I accordingly apply to the surface of the plate 12, a sensitized coating material which is acid-resisting so that it will protect the coated portions of the plate from the etching bath after the exposure has been made and the plate has been developed. For this purpose I prefer to employ a coating of sensitized enamel which is indicated at 19 in the drawing, in exaggerated form. Sensitized enamel is well known in the art and is frequently used for sensitizing the face of a photographic plate.

In the illustrated embodiment of my invention, the image which it is desired to print by means of the plate 12, consists of the broad bar or line 16, and in order to accurately reproduce this by photographic processes upon the plate 12, I make a contact print by placing the plate 12 on the blanket 10 with the sensitized face turned upwardly and then superimposing the negative 15 face downwardly upon the plate 12. It will be seen that the posts 11 pass through the apertures 14 and 18 and serve to determine the position at which the image will be formed upon the face of the plate. When the negative and plate have been assembled on the blanket in this fashion, the exposure is made and thereafter the plate is developed and the image is fixed thereon in the usual manner.

As a result of this procedure, an image 19', which is an exact replica of the image 16 on the negative, is formed upon the face of the plate 12 from the acid-resisting coating material 19. In the developing process the remainder of the

coating material is washed away leaving those portions of the face of the plate exposed.

The second step in my process is to superimpose over the image 19' a similar image in registry therewith but which is formed of lines, marks, or half-tone dots larger than those forming the first image. The second image is also conveniently formed by photographic methods and accordingly I apply to the face of the printing plate a second sensitized coating 20.

In this connection I wish to point out that in the subsequent steps of my process, I desire to remove the second image which is made from the second coating without removing or disturbing the first image, and accordingly the second coating should be made from a different material than the first coating, and should be soluble in different solvents. As previously stated, for the first coating I prefer to employ a sensitized enamel. For the second coating I may employ a sensitized ink albumen solution which is acid-resisting so as to withstand the etching bath. Sensitized ink albumen solutions of this character are also well known in the trade and are used for sensitizing photo-engraving plates.

I found that a convenient method for obtaining an enlargement of the lines, marks and dots comprising the image is to make the second exposure with the negative 15 spaced a slight distance from the surface of plate 12, rather than in direct contact therewith. For this purpose the plate 12 and negative 15 are again placed on the blanket 10 with the posts 11 extending through the apertures but, interposed between the negative and plate is a transparency 21 which may be made of glass or similar transparent material. The transparency serves to space the negative from the sensitized face of the plate.

It will be seen that the posts 11 and the apertures 14 and 18 cause the image 16 on the negative to be accurately superimposed over the first image 19' formed on the plate. When the negative, plate and transparency have been assembled on the blanket in this fashion, the second exposure is made and thereafter the plate is developed and the second image is fixed in the usual manner.

Due to the fact that the negative is spaced from the plate, light diffusion as indicated by the lines 22 in Fig. 8 serve to spread or enlarge the lines, markings, or dots forming the image with the result that in the second image, which is indicated by the numeral 20', the lines, markings, or dots are larger than and overlap the lines, markings or dots forming the first image. When the plate has been developed after the second exposure, it will appear as shown in Fig. 9, with the second image superimposed over the first image, the two images forming a protective coating for the printing portion of the plate, all other portions of the plate being exposed.

The third step in my process, after the two images have been formed, is to place the plate in an etching bath and take a relatively deep bite out of the portions of the plate which are not protected by the superimposed images. The etching of the plate may take place in the usual type of etching machine having an acid bath therein. Since the images are made of coating materials which are acid-resisting the portions of the plate covered by the images will not be etched. However, the acid bath will eat into or etch the uncovered portions of the plate.

As previously stated, I leave the plate in the

etching bath for sufficient length of time to take a relatively deep bite in the plate. In this connection, the primary precaution to be taken is to make sure that the plate does not remain in the etching bath long enough for the acid to eat away the portion of the plate underlying the margins of the second image deep enough to undercut the first image. In other words, the plate should be removed from the bath before the acid undercuts the margins of the first image 19'.

After the first deep bite has been taken in the plate, the plate will appear somewhat as shown in Fig. 10. It will thus be seen that all portions of the plate outside of the portions covered by the second image have been deep etched. It should be remembered that the image which it is desired to print by means of the plate 12, is accurately represented by the first image 19', and that the second image consists of lines, markings, or dots which are larger than those which it is desired to print.

Accordingly, after the first bite has been taken, the raised portions of the plate are too large, and the next step in my process consists of a series of etching treatments designed to reduce the size of the lines, markings, and dots to the size represented by the first image 19'. To accomplish this, I remove the coating forming the second image 20', and leave the first image intact. This may be accomplished by means of a solvent such as benzol, which will dissolve the ink albumen coating, but which will not disturb the enamel. When the second image has been removed in this fashion, the plate will appear as shown in Fig. 11, with the first image 19' intact, and with the remainder of the surface of the plate exposed. It should be noted that the raised portion of the plate is formed with exposed shoulders 23, which formerly were covered by the margins of the image 20'.

The prime purpose of the subsequent etching operations is to remove the shoulders 23 and to more deeply etch the remainder of the plate. To accomplish this result, I preferably place the plate in an etching bath and take out a second bite which is preferably somewhat less deep than the first bite so as to remove the top of the shoulders 23 as indicated at 24 in Fig. 12. However, the plate should be removed from the etching bath before the margins of the image 19' are undercut.

After the second bite has been taken, I apply an acid-resisting fluid which may take the form of an acid-resisting ink, to the upper surface of the image or raised portions of the plate. The acid-resisting ink may be applied by means of a roller due to the fact that the first bite was relatively deep, and the roller will only touch the portions of the plate covered by the image 19'. Acid-resisting inks of this character are well known and are commercially available, one such ink being disclosed in Patent No. 2,032,771, granted to Ernest Scherer, on March 3, 1936, for a Method of making halftone plates.

Inks of this type have the characteristic, that when they are heated they become thinner and flow more readily. In order to protect the side edges of the raised portion of the plate, and prevent the etching bath from undercutting the image, I apply heat to the plate for a few seconds so as to thin the ink and cause it to flow downwardly over the ledges 24, which are immediately beneath the image as shown most clearly in Fig. 13.

In this connection I leave the shoulders 25 ex-

posed for further etching. The plate is again placed in the etching bath for a relatively short period of time to take out another shallow bite. The result of the third bite is to partially eat away the shoulders 25 and to further reduce the size of the base of the raised portion of the plate, as well as to etch deeper into the face of the plate. The general appearance of the plate after the third bite is shown most clearly in Fig. 14.

Under most circumstances it is desirable to etch the plate deeper and to take out a fourth bite, and before doing this I again apply the acid-resisting ink to the image or surface of the raised portions of the plate by means of an ink roller. I again heat the plate to thin out the ink but this time I apply sufficient heat to permit the ink to run down the sides of the raised portions to the base thereof, as indicated at 26 in Fig. 15. The plate is then placed in the etching bath for a relatively short period of time to take out another relatively shallow bite. The appearance of the plate after the fourth bite, is shown in Fig. 16. Thereafter, the acid-resisting coating is washed from the printing portions of the plate and the plate takes on the appearance shown in Fig. 17.

If desired, after the required reduction in depth of the plate has been obtained, the plate may be subjected to a "snap bite," which is an etching treatment for a very short period of time, usually for not over 30 seconds. After the plate has been prepared in the manner described above, the more open portions of the plate may be routed out in the usual fashion, and the plate is then ready for printing.

In the illustrated and described embodiment of my invention, I have shown an image consisting of a relatively large bar or line. It should be understood, of course, that my invention is equally applicable to printing images formed of narrow lines, half-tone dots, or other similar markings. I also wish to point out that the first bite which is taken in the plate should be relatively deep, and in this connection the bite should be deep enough so as to permit the application of the acid-resisting ink by means of a roller, without the ink being deposited on any of the more open portions of the plate.

From the foregoing description of the illustrative embodiment of my invention, it will be appreciated that I have provided an improved process for making printing plates which is relatively simple and inexpensive to carry out, which is expeditious, and which provides printing images having sharp, clear-cut lines and well defined, deeply cut half-tone dots, accurately graduated from the high-lights through the middle tones to the shadows.

It will be understood that modifications can be made in the illustrated and described embodiment of my invention, without departing from the invention as set forth in the accompanying claim. Thus it is possible that instead of forming only two superimposed images upon the printing plate, in certain instances it may be desirable to form three or more superimposed images, adjacent images being formed from different coating materials so that each image can be separately removed and each succeeding image being formed of lines and marks of greater size than and overlapping the lines and marks forming the preceding image. When a plurality of superimposed images are formed in this fashion, the plate will first be etched with all of the superimposed images in place so as to take a relatively deep bite out of the plate. Thereafter between

the removal of each successive image, the plate will be further etched.

I claim:

The process of making a printing plate which comprises: First, forming a first image from a coating material on the face of a printing plate, the image being an exact replica of the image to be printed; Secondly, forming a second image from a coating material over the first image, the second image being identical with the first image but being formed of lines and marks of greater size than, and overlapping the lines and marks forming the first image; Thirdly, etching the plate having both images thereon so as to take

5 a relatively deep bite in the portions of the plate outside of the second image; Fourthly, removing the second image from the plate while leaving the first image intact; and, Lastly, subjecting the plate to successive etching operations in each of which a relatively shallow bite is taken from the unprotected portions of the plate and applying to the top of the raised portions of the plate containing the first image between successive 10 etching operations, an acid-resisting fluid which is caused to run at least partially down the etched sides of the raised portions.

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